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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/040,392 | 01/09/2002 | Masao Fukagawa | Q67894 | 2098 |

7590 08/20/2004

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| EXAMINER |
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HUISMAN, DAVID J

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| ART UNIT | PAPER NUMBER |
|----------|--------------|

2183

DATE MAILED: 08/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

| | | |
|------------------|-----------------|--|
| Application No. | Applicant(s) | |
| 10/040,392 | FUKAGAWA, MASAO | |
| Examiner | Art Unit | |
| David J. Huisman | 2183 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 4 is/are rejected.
- 7) ☒ Claim(s) 2,3,5 and 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1-02, 6-02, 11-03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-6 have been examined.

Papers Submitted

2. It is hereby acknowledged that the following papers have been received and placed of record in the file: IDS and Foreign Priority Papers as received on 1/9/2002, IDS as received on 6/28/2002, and IDS as received on 11/25/2003.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
4. The abstract of the disclosure is objected to because of the following minor informalities: Please remove the reference numbers from the abstract. Correction is required. See MPEP § 608.01(b).
5. A substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is required. The substitute specification filed must be accompanied by a statement that it contains no new matter.
6. The disclosure, including the claims and abstract, is objected to because the specification is replete with grammatical errors. The applicant or their representatives are urged to review the specification and submit corrections for all mistakes of a grammatical, clerical, or typographical nature. A small portion of the informalities include: Remove "as" on page 1, lines 9 and 24. Also, replace "as" with --a-- on page 1, line 25. On page 2, replace "as" with --a-- in lines 3 and

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5. Replace "a" with --an-- on page 2, line 6. The words "cancel" and "broad" are incorrectly used on page 2, lines 10 and 13, respectively. On page 2, line 25, insert --buffer-- after "re-order" (this mistake is made several times throughout the specification so they should all be corrected). On page 3, line 2, replace "an re-order" with --a re-order--. On page 3, line 4, replace "a instruction" with --an instruction--. Applicant refers to "hit/mistake" and "mistake-signal" multiple times. The examiner recommends replacing "mistake" with --miss--. The applicant also refers to "a branch-prediction failed branch instruction". This is unclear and the examiner asks that it be reworded in a more clear fashion. Many additional mistakes exist and they should be corrected.

Appropriate correction is required.

Claim Objections

7. Claims 1-6 are objected to because of the following informalities: The claims contain language which is grammatically incorrect and difficult to understand. The applicant is urged to rewrite each of the claims so that they are clear and concise. Some of the mistakes include: On page 21, line 2, replace "an re-order" with --a re-order--. On page 21, line 4, replace "a instruction" with --an instruction--. On page 21, line 5, insert --a-- before "dependence". On page 21, line 8, insert --a plurality of-- before function units. On page 21, line 9, insert --a-- before WRB. On page 21, line 20, insert --buffer-- after "re-order". The applicant also refers to "a branch-prediction failed branch instruction" on page 21, line 20. This is unclear and the examiner asks that it be reworded in a more clear fashion. Each of the claims should be checked for similar errors. Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Tan, U.S.

Patent No. 5,870,579.

10. Referring to claim 1, Tan has taught a managing method for a re-order buffer (Fig. 1, component 32) in an out-of-order execution processor (see first sentence of abstract) for predicting the flow of a program by a branch prediction (Fig. 1, component 14), finding out a next executable instruction from an instruction string in the program and speculatively executing the instruction on the basis of a dependence relationship between the prediction and the instruction (see the abstract), in which said re-order buffer rewrites an execution result according to a program order and the end of the instruction is notified from each of function units containing a branching unit and a load unit to said re-order buffer by using WRB number corresponding to an entry number of said re-order buffer (Fig. 1 and column 12, lines 15-20), which comprises the steps of:

a) managing the latest speculation state of a load instruction issued to said load unit by said load unit on the basis of a branch prediction success/failure signal output from said branching unit and suppressing notification to said re-order buffer by said load unit, as to a subsequent load instruction of a branch instruction for which the branching prediction has failed, on the basis of

the WRB number of the subsequent load instruction even when the processing of the load instruction concerned is finished. See column 11, lines 29-43, and note that when a branch is mispredicted, any instruction within the functional units is flushed. This would prevent the load instruction from finishing. Furthermore, even if the load has completed, the cancel bit associated with the load instruction which has been allocated an entry within the reorder buffer will be set so that the reorder buffer knows that the instruction should not be retired.

b) re-using an entry stored with the subsequent instruction of the branching-prediction failed branching instruction by the re-order buffer to store a new instruction before the end notification based on the WRB number of the entry concerned is received. See column 29, lines 13-29. Note that if the cancel bit has been set, then the null bit of the entry holding the cancelled instruction is set, thereby indicating that the entry does not have an instruction (i.e., it may be used for allocation). And, if that instruction has been flushed, then the reuse of the entry will happen before an end notification is received because it will not be received because the instruction never ended (it was flushed). Instead, the cancel bit is used to say the instruction has been cancelled.

11. Referring to claim 4, Tan has taught an out-of-order execution processor (see abstract) for predicting the flow of a program by branch prediction (Fig.1, component 14), finding out next executable instruction from an instruction string in the program and speculatively executing the instruction on the basis of a dependence relationship between the prediction and the instruction, in which a re-order buffer (see the abstract and Fig.1, component 32) in said processor rewrites an execution result according to a program order and the end of the instruction is notified from each of function units containing a branching unit and a load unit to said re-order buffer by using

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WRB number corresponding to an entry number of said re-order buffer (Fig. 1 and column 12, lines 15-20), which comprises:

- a) managing means for managing the latest speculation state of a load instruction issued to said load unit on the basis of a branch prediction success/failure signal output from notification to branch instruction for which the branching prediction has failed, on the basis of the WRB number of the subsequent load instruction even when the processing of the load instruction concerned is finished, said managing means being contained in said load unit. See column 11, lines 29-43, and note that when a branch is mispredicted, any instruction within the functional units is flushed. This would prevent the load instruction from finishing. Furthermore, even if the load has completed, the cancel bit associated with the load instruction which has been allocated an entry within the reorder buffer will be set so that the reorder buffer knows that the instruction should not be retired.
- b) wherein the re-order re-uses an entry said branching unit and suppressing said re-order buffer, as to a subsequent load instruction of a stored with the subsequent instruction of the branching-prediction failed branching instruction to store a new instruction before the end notification based on the WRB number of the entry concerned is received. See column 29, lines 13-29. Note that if the cancel bit has been set, then the null bit of the entry holding the cancelled instruction is set, thereby indicating that the entry does not have an instruction (i.e., it may be used for allocation). And, if that instruction has been flushed, then the reuse of the entry will happen before an end notification is received because it will not be received because the instruction never ended (it was flushed). Instead, the cancel bit is used to say the instruction has been cancelled.

Allowable Subject Matter

12. Claims 2-3 and 5-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and if all objections/rejections pertaining to these claims have been overcome (see above).

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant is reminded that in amending in response to a rejection of claims, the patentable novelty must be clearly shown in view of the state of the art disclosed by the references cited and the objections made. Applicant must also show how the amendments avoid such references and objections. See 37 CFR § 1.111(c).

Asato, U.S. Patent No. 6,289,442, has taught a circuit and method for tagging, with numbers, and invalidating speculatively executed instructions.

Loper et al., U.S. Patent No. 5,611,063, has taught a method for executing speculative load instructions in high-performance processors.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David J. Huisman whose telephone number is (703) 305-7811.

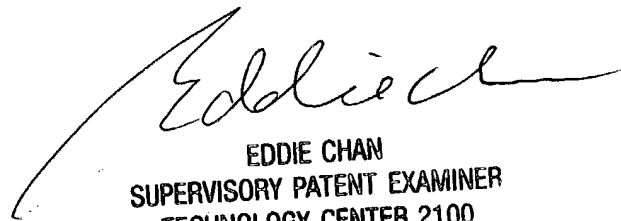
The examiner can normally be reached on Monday-Friday (8:00-4:30).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (703) 305-9712. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DJH
David J. Huisman
July 28, 2004



EDDIE CHAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100